

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Kanji Imanishi  
Serial No.: 10/614,949  
Filed : July 8, 2003  
Title : HARD DISK RECORDER HAVING TIME-SHIFT PLAYBACK FUNCTION

Art Unit : 2621  
Examiner : J. A. Fletcher

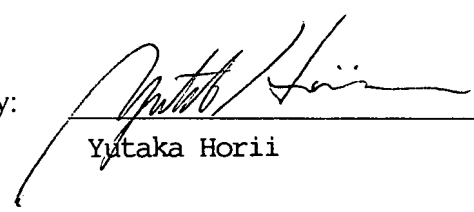
MS Amendment  
Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

**VERIFICATION OF TRANSLATION**

I, Yutaka Horii of Fukami Patent Office, hereby  
declare as follows:

- (1) I am fluent in both the Japanese and English languages;
- (2) I have read both the translation of the Japanese Patent Application No. 2002-199516 filed July 9, 2002, from Japanese to English and the original Japanese text;
- (3) The English translation is a true and correct translation of the Japanese Patent Application No. 2002-199516 filed July 9, 2002, to the best of my knowledge; and
- (4) That all statements made are of my own knowledge, are true, and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that such false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: June 15, 2007

By:   
Yutaka Horii

日 本 国 特 許 庁  
JAPAN PATENT OFFICE

別紙添付の書類に記載されている事項は下記の出願書類に記載されている事項と同一であることを証明する。

This is to certify that the annexed is a true copy of the following application as filed with this Office

出 願 年 月 日  
Date of Application:

2002年 7月 9日  
July 9, 2002

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Application Number:

特願2002-199516  
[JP2002-199516]

ST.10/C ]:

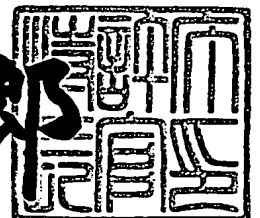
出 願 人  
Applicant(s):

船井電機株式会社  
FUNAI ELECTRIC CO., LTD.

2003年 5月13日  
May 13, 2003

特 許 庁 長 官  
Commissioner,  
Japan Patent Office

太田 信一郎  
Shinichiro Ota



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[Filing Date]	July 9, 2002
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[International Class]	G11B 19/02
[Title of the Invention]	Hard Disk Recorder
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[Inventor]	
[Address]	c/o FUNAI ELECTRIC CO., LTD., 7-1, Nakagaito 7-chome, Daito-shi, Osaka
[Name]	Kanji IMANISHI
[Applicant]	
[Identification Number]	000201113
[Address]	7-1, Nakagaito 7-chome, Daito-shi, Osaka
[Name]	FUNAI ELECTRIC CO., LTD.
[Attorney]	
[Identification Number]	100064746
[Patent Attorney]	
[Name]	Hisao FUKAMI
[Appointed Attorney]	
[Identification Number]	100085132
[Patent Attorney]	
[Name]	Toshio MORITA
[Appointed Attorney]	
[Identification Number]	100083703

[Patent Attorney]		
[Name]	Gihei NAKAMURA	
[Appointed Attorney]		
[Identification Number]	100096781	
[Patent Attorney]		
[Name]	Yutaka HORII	
[Appointed Attorney]		
[Identification Number]	100098316	
[Patent Attorney]		
[Name]	Hisato NODA	
[Appointed Attorney]		
[Identification Number]	100109162	
[Patent Attorney]		
[Name]	Masayuki SAKAI	
[Indication of Fee]		
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[List of the Accompanying Documents]		
[Document]	Specification	1
[Document]	Drawings	1
[Document]	Abstract	1
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[Document Name] Specification

[Title of the Invention] Hard Disk Recorder

[Scope of Claims for Patent]

[Claim 1] A hard disk recorder having a time-shift playback function of storing on a hard disk a program which is now being received, displaying the stored program, even if program-storing is still under way, in such a manner that the program is displayed from an arbitrary section of the program among program sections that have already been stored, and pausing the display of the program or changing the display speed according to an operation by a user while the program is being watched, comprising

control means responsive to a channel-switch instruction for setting said hard disk in a pause state from which a storing operation can immediately be started and thereafter setting said hard disk in a recording-wait state to switch the channel and, according to a determination that said hard disk is in the recording-wait state, setting said hard disk in a playback state.

[Claim 2] A hard disk recorder capable of storing on a hard disk a program which is now being received and displaying the stored program, comprising

control means responsive to a channel-switch instruction for setting said hard disk in a pause state from which a storing operation can immediately be started and thereafter setting said hard disk in a recording-wait state to switch the channel and, according to a determination that said hard disk is in the recording-wait state, setting said hard disk in a playback state.

[Detailed Description of the Invention]

[Technical Field to Which the Invention Belongs]

The present invention relates to hard disk recorders. In particular, the present invention relates to a hard disk recorder having a time-shift playback function of storing a program which is now being received, displaying the stored program, even if program-storing is still under way, in such a manner that the program is displayed from an

arbitrary section of the program among program sections that have already been stored, and pausing the display of the program or changing the display speed according to an operation by a user while the program is being watched.

[Prior Art]

A hard disk recorder is disclosed as a TV program-watching device in Japanese Patent Laying-Open No. 2002-44542. Such a hard disk recorder was put into practical use as low-cost manufacturing of a large-capacity hard disk (hereinafter referred to as HDD) was achieved. The conventional video tape recorder (VTR) can perform only recording or playback, and thus it cannot play back a recorded program until it completes recording of the program. On the other hand, the hard disk recorder has a feature that it can use the time-shift playback function to display a program, even if storing of the program on the HDD is under way, from an arbitrary section of the program among program sections that have already been stored. The hard disk recorder includes such a buffer as shown in Fig. 4 for successively storing information concerning selected programs. In the example shown in Fig. 4, the program information is stored in the order of channel 1, channel 2, external input, channel 1.

[Problems to be Solved by the Invention]

Regarding the already-proposed hard disk recorder, however, when the user switches the channel from channel 1 to channel 2, the user cannot watch already-stored contents of channel 1 any more, despite that information about the program which has been recorded is stored in the buffer. This is for the reason that a sector address of the HDD is cleared and returned to a leading address and thus it cannot know which section of the program was lastly played back.

Therefore, when the program is being stored, switching of the channel or switching of the input source is inhibited or the time-shift function is stopped. Thus, the user is required to take care that the user never switches the channel or switches the input source when the time-shift playback function is effective. Moreover, the already-proposed hard disk recorder has a disadvantage that switching of the channel takes a

considerable time.

Fig. 5 is a flowchart illustrating the conventional channel-switching operation. When an instruction to switch the channel is issued, a stop command is output from a control IC chip. This stop command includes a pause command in step SP (only shown as SP in the drawing) 1, an idle command in step SP2 and a stop command in step SP3. In step SP1, if the instruction is issued, the HDD is set in a pause state from which a program-storing operation can immediately be started, without stopping such a hardware structure as HDD. In step SP2, the HDD is set in a recording-wait state, namely idle state and then set in a stop state in step SP3. In step SP4, the channel switching operation is carried out.

In step SP5, it is determined whether or not playback of stored images by the HDD is possible. This determination is done according to a status of the control IC chip. If playback is possible, the control IC chip outputs a playback command. The playback command includes a stop command in step SP6, an idle command in step SP7 and a pause command in step SP8. According to the playback command, the HDD is set in a stop state in step SP6, in an idle state again in step SP7, and a pause state in SP8. Then, in step SP9, the playback operation is carried out.

In the conventional channel-switching operation, the stop command and the playback command from the control IC chip are used to completely stop the HDD before the channel is switched and make a transition to the playback state by operating the HDD. There is a further problem that the channel switching operation takes several tens of seconds.

A chief object of the present invention is to provide a hard disk recorder capable of continuously storing programs without stopping the time-shift function even if the channel or the input source is switched and capable of speedily switching the channel.

#### [Means for Solving the Problems]

The present invention is a hard disk recorder having a time-shift playback function of storing on a hard disk a program which is now being received, displaying the

stored program, even if program-storing is still under way, in such a manner that the program is displayed from an arbitrary section of the program among program sections that have already been stored, and pausing the display of the program or changing the display speed according to an operation by a user while the program is being watched. The hard disk recorder includes control means responsive to a channel-switch instruction for setting the hard disk in a pause state from which a storing operation can immediately be started and thereafter setting the hard disk in a recording-wait state to switch the channel and, according to a determination that the hard disk is in the recording-wait state, setting the hard disk in a playback state.

Another invention is a hard disk recorder capable of storing on a hard disk a program which is now being received and displaying the stored program. The hard disk recorder includes control means responsive to a channel-switch instruction for setting the hard disk in a pause state from which a storing operation can immediately be started and thereafter setting the hard disk in a recording-wait state to switch the channel and, according to a determination that the hard disk is in the recording-wait state, setting the hard disk in a playback state.

#### [Embodiments]

Fig. 1 is a block diagram of a hard disk recorder according to one embodiment of the present invention. Referring to Fig. 1, an image signal of an external input is converted by an A/D converter 1 into a digital signal and provided to a compression processing unit 4, and an image signal from an antenna is received by a tuner 2, converted by an A/D converter 3 into a digital signal and provided to compression processing unit 4. Compression processing unit 4 compresses the image signal for reducing the information amount of the image signal and the resultant signal is stored on HDD 6. A storage unit 5 constructed of a semiconductor memory and the like stores information concerning a program which is stored on HDD 6.

When the image signal stored on HDD 6 is read, information about the image signal is also read from storage unit 5 and provided to an expansion processing unit 7



where the original image signal of the program is subjected to expansion processing. Then, the image signal is converted by a D/A converter 9 into an analog signal and output to the outside. It is noted that the hard disk recorder includes a DVD player 10 and the image signal is also output from DVD player 8.

A control unit 10 controls compression processing unit 4, HDD 6, expansion processing unit 7 and DVD player 9 and further performs a channel switching operation.

Fig. 2 is a flowchart illustrating an operation of the hard disk recorder according to the embodiment of the present invention, and Fig. 3 shows a time sequence.

The flowchart shown in Fig. 2 illustrates an operation of allowing channel switching when HDD 6 is storing a program. When a channel-switch instruction is issued, control unit 10 immediately outputs a pause command, not the conventional stop command, in step SP 11, and accordingly the HDD is set in a pause state from which a program storing operation can immediately be started upon receiving a command without stopping such a hardware structure as HDD 6. In step SP12, control unit 10 sets the HDD in a recording-wait state, namely an idle state. After this, in step SP13, a channel switching operation is carried out.

In step SP14, it is determined whether or not HDD 6 is in an idle state. If HDD 6 is not in the idle state, the operation waits until HDD 6 enters the idle state. In step P14, when it is determined that the HDD is in the idle state, a playback operation is done in step 15.

According to the conventional method as shown in Fig. 3 (a), when the channel-switch instruction is issued, a stop command including pause, idle and stop commands is output so as to completely stop HDD 6. Then, after the channel is switched, a playback command including stop, idle and pause commands is output so as to operate HDD 6. A long time (several tens of seconds) is accordingly required for starting a storing operation.

According to the present invention as shown in Fig. 3 (b), when the channel-switch instruction is issued, a transition is made from the pause state to the idle state and

thereafter the channel is switched without stopping HDD 6. Then, after it is confirmed that HDD 6 is in the idle state, a playback operation is immediately performed. Moreover, the storing operation can be started in approximately 0.1 second.

Embodiments herein disclosed are to be construed as examples in all respects, not as limitations. It is intended that the scope of the invention is defined by claims, not by the description above, and includes all modifications equivalent in meaning and scope to the claims.

#### [Effects of the Invention]

As discussed above, according to the present invention, in response to a channel-switch instruction, the hard disk is set in a pause state from which a storing operation can immediately be started, then set in a recording-wait state for switching the channel, and then set in a playback state according to a determination that the hard disk is in the recording-wait state. It is thus possible to continue storing of the program without stopping the time-shift function. Moreover, the time required for switching the channel that is conventionally several tens of seconds can remarkably be shortened to approximately 0.1 second.

#### [Brief Description of the Drawings]

Fig. 1 is a block diagram of a hard disk recorder according to one embodiment of the present invention.

Fig. 2 is a flowchart illustrating a channel switching operation of the hard disk recorder according to the embodiment of the present invention.

Fig. 3 shows a time sequence illustrating a conventional channel switching operation and shows a time sequence illustrating the channel switching operation according to the embodiment of the present invention.

Fig. 4 shows a buffer included in the hard disk recorder.

Fig. 5 is a flowchart illustrating a channel switching operation of a conventional hard disk recorder.

#### [Description of the Reference Characters]

## PATENT ABSTRACTS OF JAPAN

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(71)Applicant : FUNAI ELECTRIC CO LTD

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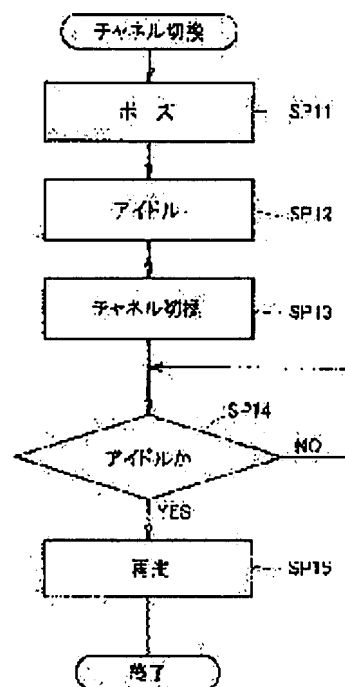
(72)Inventor : IMANISHI KANJI

## (54) HARD DISK RECORDER

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a hard disk recorder capable of continuing, even when a channel or an input source is switched, storage of a program without stopping a time shift function so as to quickly switch channels.

**SOLUTION:** The hard disk recorder stores a program during reception into an HDD 6 and has a time shift reproduction function for: displaying the stored program from an optional part within a stored range even during the storage processing; and, by the operation of a user, temporarily stopping the program display and revising a display speed when viewing the program. When a channel switch instruction is given, a control section 10 brings the HDD 6 to a pause state from which the HDD 6 can immediately enter a storage operation, then brings the HDD 6 to a recording wait state to perform channel switching and further brings the HDD 6 to a playback state after discriminating that the hard disk is in a video recording waiting state.



## LEGAL STATUS

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[Date of final disposal for application]

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[Date of registration]

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rejection]

[Date of requesting appeal against examiner's decision of rejection] 17.11.2005

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1, 3 A/D converter, 2 tuner, 4 compression processing unit, 5 storage unit, 6 HDD, 7 expansion processing unit, 8 D/A converter, 9 DVD player, 10 control unit

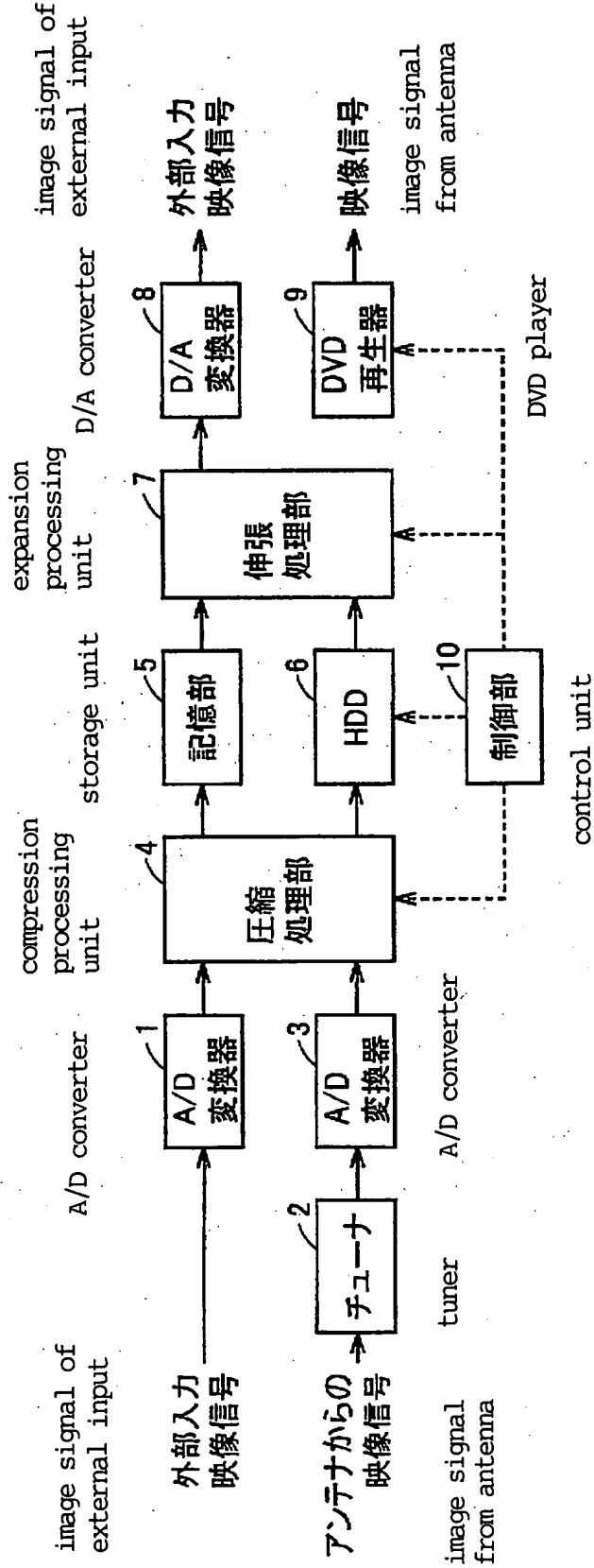
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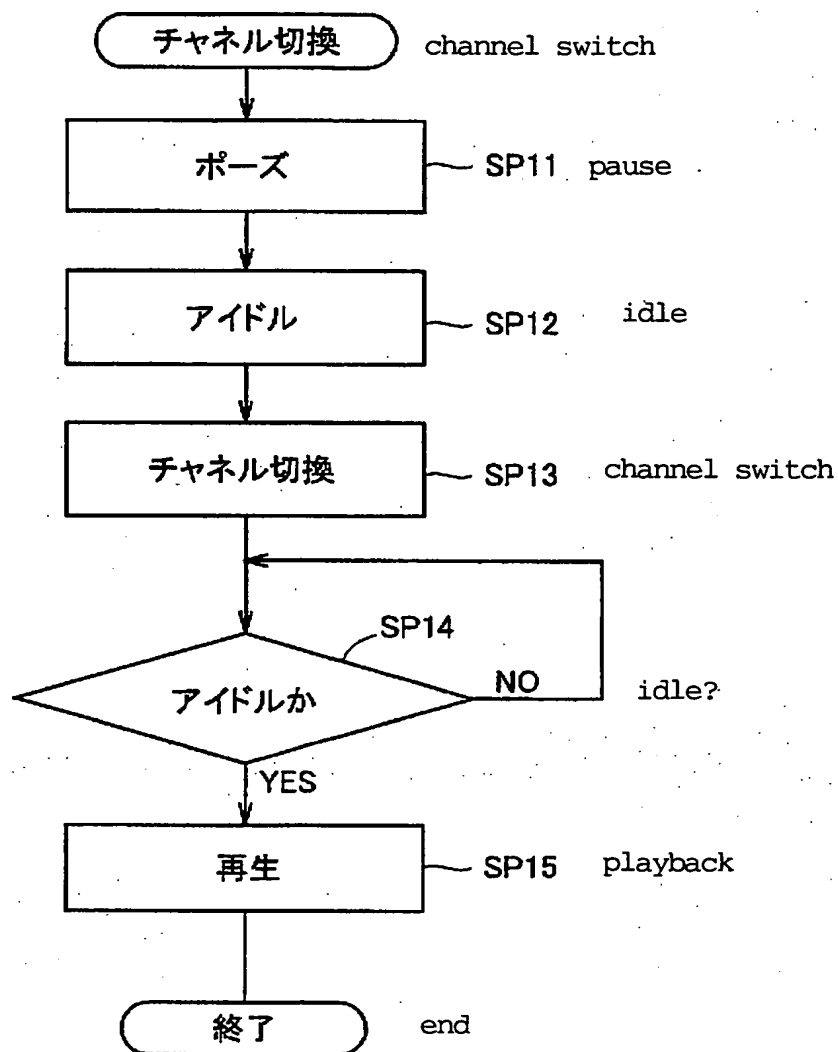
図面

(Document Name) Drawings

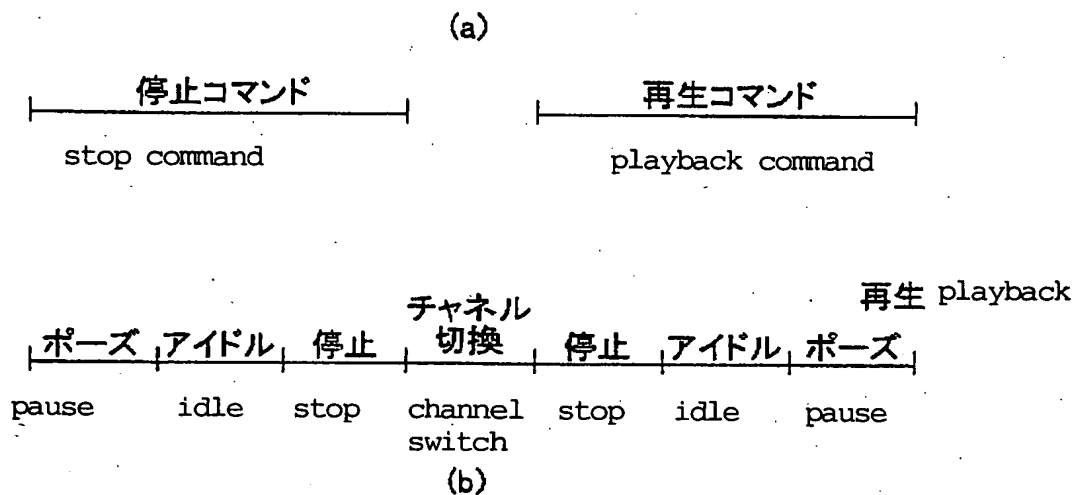
【図1】 Fig. 1



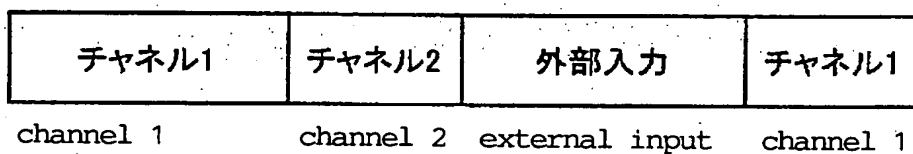
【図 2】 Fig. 2



【図 3】 Fig. 3

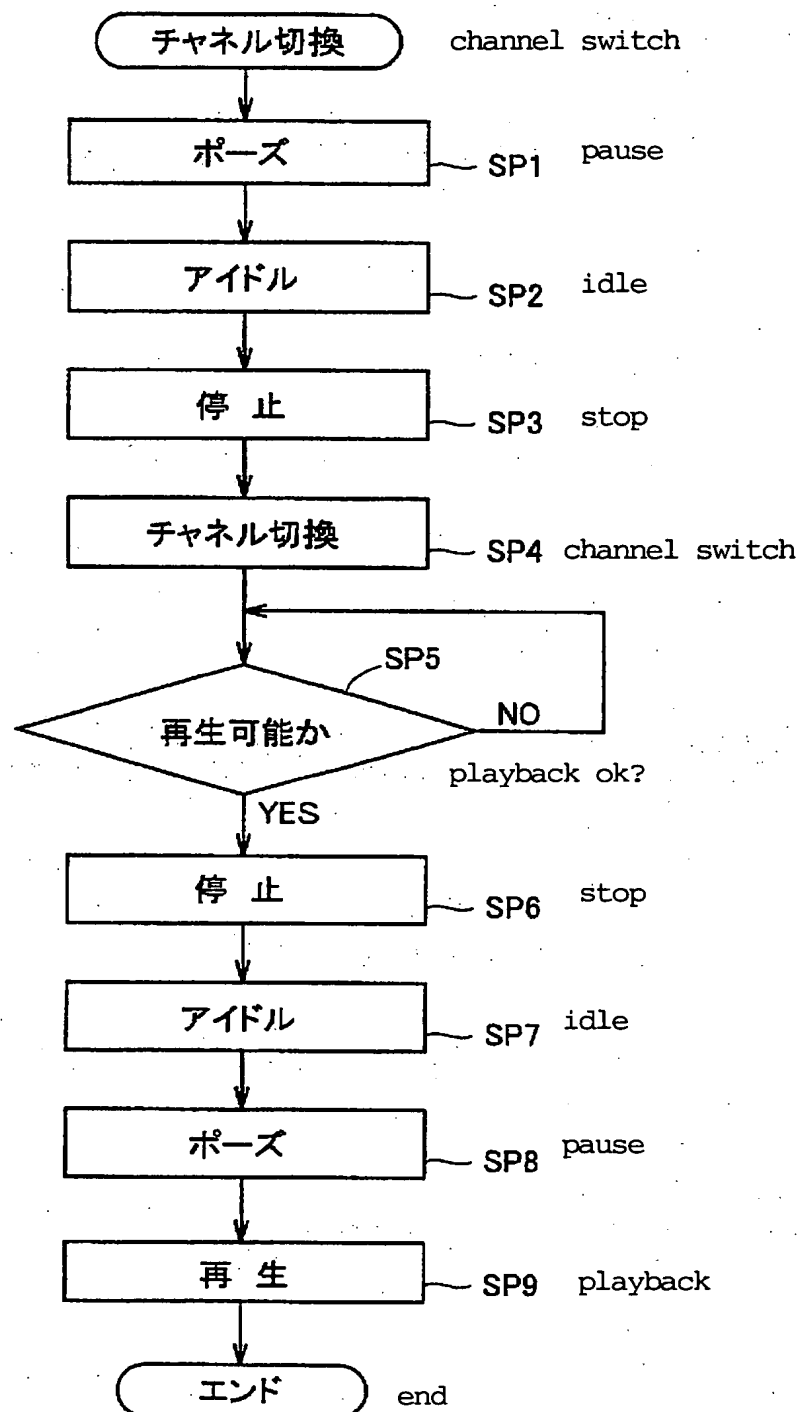


【図 4】 Fig. 4





【図 5】 Fig. 5



[Document Name] Abstract

[Abstract]

[Subject] A hard disk recorder is provided that is capable of continuously storing programs without stopping the time-shift function even if the channel or the input source is switched and capable of speedily switching the channel.

[Solving Means] A hard disk recorder has a time-shift playback function of storing, on an HDD 6, a program which is now being received, displaying the stored program, even if program-storing is still under way, in such a manner that the program is displayed from an arbitrary section of the program among program sections that have already been stored, and pausing the display of the program or changing the display speed according to an operation by a user while the program is being watched. A control unit 10 sets, in response to a channel-switch instruction, the HDD 6 in a pause state from which a storing operation can immediately be started, thereafter sets the HDD in a recording-wait state to switch the channel, and sets the HDD in a playback state according to a determination that the HDD is in a recording-wait state.

[Selected Drawing] Fig. 2